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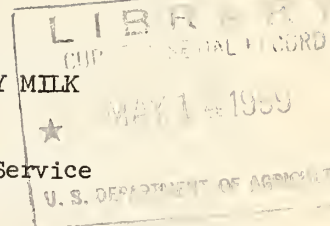
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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Marketing Research Division

INSECT PREVENTION AND CONTROL IN PLANTS PROCESSING DRY MILK

Prepared by
Stored-Product Insects Section, Agricultural Marketing Service
in cooperation with
Department of Entomology
Wisconsin Agricultural Experiment Station 1/



IN BRIEF

1. Learn to recognize the major insect pests of dry milk--the several species of Trogoderma and the black carpet beetle.
2. Practice proper plant sanitation and good housekeeping at all times, making frequent use of a heavy-duty vacuum cleaner and paying special attention to ducts, conduits, conveyors, switch boxes, motors, cabinets, pipes, and supports. Appoint a certain individual as sanitarian to see such practices are carried out. This should include cleaning the sifting and packaging room daily, and the equipment after each run.
3. Inspect plant, warehouses, and adjacent grounds frequently for the presence of insects. Look for bird and wasp nests which frequently harbor insects. Check rat baits as they are ideal media for insect growth and development if they are not treated with an insecticide. Inspect incoming supplies for the presence of insects.
4. Eliminate where possible construction faults conducive to insect growth and development, and seal cracks in ceilings, walls, door casings, windows, and other openings so as to be tight fitting. In new construction avoid these and such other faults as dead-end spaces, hard-to-clean areas, etc., by careful planning.
5. Keep all windows and doors screened at all times and equip the latter with self-closing devices. All openings through which materials are handled should be equipped with fly-chaser fans or other devices to prevent insect entrance. KEEP INSECTS OUT.
6. Store milk and packaging materials separately and in areas away from sweepings, milk to be used for animal feed, and other items which might attract insects.
7. Spray with 2 percent malathion on a 2-month schedule throughout the warmer seasons.
8. Keep records of your sanitation and spraying procedures.

1/ Approved for publication by the Director of the Wisconsin Agricultural Experiment Station. Supersedes unnumbered processed report "Procedure for Insect Prevention and Control in Plants Processing Nonfat Dry Milk Solids."

April 1959

Insect infestation in stored dry milk can become a serious and expensive problem. Although insects do not appear to like dry milk in itself as food, they are frequently attracted to and found in milk which has become contaminated with other materials when allowed to accumulate in plants and warehouses. From such sources of infestation, insects may get into milk to be used for human food. Recent tests conducted by this Section indicate that the present procedure of storing dry milk in a fiberboard drum with polyethylene and kraft liners presents a package which is highly resistant to insect invasion after the milk has been placed in storage, unless, of course, the drum has been roughly handled and damaged in transit. Therefore, the primary responsibility for the prevention of insect contamination must lie with the manufacturer. However, in light of the current trend of packaging milk in kraft bags, increased attention must also be given to insect prevention and control in warehouses, as the present method of closure offers little resistance to insect invasion through the stitched top. Proper insect prevention and control are, therefore, necessary in both plants and warehouses to provide a product which will meet the standards of industry, the Department of Agriculture, and the Food and Drug Administration.

Procedures given here are suggested guides to the prevention of insect infestation but additional initiative must be exercised to adapt and expand them to individual plants.

These procedures are based on the best information available to date.

INSECTS INVOLVED

The most frequently encountered insect pests of dry milk are three small beetles. Two of them for the want of a satisfactory common name will be referred to as Trogoderma. One of these is Trogoderma inclusum, which is probably the most important and is the one usually found in the milk itself, and the other is T. glabrum. T. inclusum has been given the common name "larger cabinet beetle," but this is not appropriate in its relation to the infestation of dry milk. The third, Attagenus piceus, which is also frequently encountered in homes, is commonly known as the black carpet beetle and is also one of the most important pests of stored woolens. All these belong to the same family of insects, Dermestidae, and collectively are frequently called dermestids.

All three insects pass through the four usual stages of development--egg, larva, pupa, and adult. The eggs are opaque white or light gray in color, and long oval in shape. They usually hatch in 1 to 2 weeks if the temperature in the environment is in the mid-seventies or higher. The small larvae which hatch from the eggs are just visible to the naked eye, but as they feed they increase in size and shed their skins a number of times. All larvae are long, narrow, and tapered toward the rear, at the end of which is usually a tuft of long hairs. The larvae of T. inclusum are light tan with a dark brown tip at the tapered end of the body, and those of T. glabrum have dark horizontal stripes across the length of the body. Black carpet beetle larvae are uniformly dark brown. When fully grown the larvae may range from 1/4 to 1/2 inch in length. The larval period of Trogoderma may be as short as 2 months under favorable conditions and as long as several years under unfavorable conditions of low temperatures or scarce food supplies. The minimum period in which the black carpet beetle is in the larval stage, even under the most favorable conditions, is approximately 9 months, and again the maximum may be several years. The larval stage of these insects is the one most frequently found, because it is the active feeding stage and because the insect spends the greatest part of its life as a larva. The tissue-thin brownish skins cast while the larvae are growing are probably the best clues to the presence of an infestation. The living larvae are usually hidden in cracks and other dark areas.

When the larvae are fully grown, they transform into a pupal, or resting, stage which usually lasts 2 or 3 weeks. The pupae of Trogoderma are smooth, compact, tan in color and oval in shape, with a somewhat hardened exterior. The pupae of the black carpet beetle are more tear-shaped, soft, and cream colored. The adults, which are small beetles, emerge from the pupae and live for 2 to 4 weeks. The adults of Trogoderma are about 1/8 to 3/16 inch long, shaped somewhat like a small ladybird beetle, and are blackish, mottled with gray or brown. The adult black carpet beetle is somewhat larger and is shiny black. The female, which is also usually larger than the corresponding male, lays from 50 to 100 or more eggs during her lifetime.

Flour beetles, "weevils," moths, midges, roaches, flies, ants, and silverfish which may be pests in food processing plants may get into dry milk unless adequate control measures are taken. Although control procedures for Trogoderma and the black carpet beetle will aid materially in reducing problems with these other pests, the latter will usually require additional control techniques based on their habits and life history and will not be discussed here. It is important to know which insect is involved in an infestation in order to best deal with the problem. Therefore, if you are not certain of the identity, collect some specimens, place them in a small vial full of rubbing alcohol, and send them to your state entomologist, extension entomologist, county agricultural agent, or the Entomology Research Division of the U. S. Department of Agriculture, Washington 25, D. C. Be sure your name and address are with the package that is sent so it can be identified with your letter of transmittal. You should tell where the insects were found, describe any damage they caused, and give any other observations you think may be pertinent. Publications on the control of common insects can also be obtained from most of the above sources. Many of the publications may be written primarily for control in the home, but the method and basic principles will be the same. Slight modifications can be made to conform to the general requirements and conditions in your plant.

PLANT SANITATION AND OPERATIONS IN RELATION TO INSECT PREVENTION

PROPER SANITATION is the most important means of preventing insect troubles in a food plant. Sanitation and good housekeeping should receive constant attention both inside and outside the plant. The program should, first of all, be based on the idea of prevention rather than control--KEEP INSECTS OUT. By a thorough cleaning remove any insects that may have already become established and also any materials upon which they might feed. When insecticides are used, they will control insects more effectively in clean premises. Any debris or milk accumulation affords a protective barrier against contact with insecticides. It is not possible to discuss all measures required to keep a plant clean as each presents individual problems or special conditions. The appearance of your plant has a pronounced effect on the public's opinion about the purity and wholesomeness of your food product, and a clean plant is a necessary prerequisite to purchase contracts. By law, the Food and Drug Administration is empowered to seize a food product that has been processed or handled under circumstances whereby it may have become contaminated, even though no contamination is detected. Therefore:

A. Designate one certain individual in each plant as the sanitarian responsible for sanitation and insect prevention, even though professional sanitation or pest control services are used. Give him additional training if he needs it, and proper authority and adequate equipment to accomplish the desired objectives.

B. Use a heavy-duty industrial vacuum cleaner with suitable attachments to clean otherwise difficult areas. This is essential equipment in a milk-drying plant. The sifting and packaging room should be thoroughly vacuumed or washed daily and the equipment cleaned at the end of each run. Set up a regular schedule for vacuuming the entire plant thoroughly every 2 months, except in those areas in which liquid milk is handled, as the latter area is usually washed daily anyway. During the vacuuming, clean parts and equipment storage areas and other less-used parts of the plant. Areas used for the temporary storage of milk should be vacuumed as soon as a supply of milk is moved out, and areas in which containers and liners are stored should be scrupulously clean at all times. Under some conditions it may be necessary to vacuum a plant more frequently than every 2 months. Be sure to dispose of materials picked up by vacuum cleaners by burning or other methods in order to destroy any insects which might be present, otherwise they will only serve as an additional source of infestation. Dust from grinding, sifting, and packaging operations is one of the major causes of insect trouble in the drying plant, as it drifts through the plant and settles into cracks in floors and walls, on top of beams, on ledges, above window and door frames, into electric fuse and switch boxes, inside conduits, into cabinets, and into any number of small openings. Frequent vacuuming will prevent the accumulation of debris necessary for insects to complete a life cycle and multiply, and will remove any insects that may have become established.

C. Provide an adequate dust collector system for sifting and packaging rooms and for other areas where dust occurs. The dusts and collectors should be of metal and constructed so that all areas are accessible for inspection and cleaning. If a collector system is not feasible, provide adequate exhaust fans equipped with dust traps. The traps will prevent an accumulation of dust around the outside of your plant where it would serve as food for insects and provide a source of infestation.

D. Clean, scrub, and flush processing areas, if possible, with hot water or live steam at least once a day. If drier or sifting areas also have washable floors and walls, they should be flushed at least at the end of every run. Thoroughly clean the inside and outside of conveyors, chutes, grinders, sifters, hoppers, and packaging equipment at the end of each run or at the minimum of once a week. Pay special attention to dead-end spaces, ledges, or other places where the product accumulates. If insects are allowed to develop here, such spaces provide a constant supply of eggs or insects, or both, to infest the product and go into the containers with the product when it is packaged.

E. Empty garbage, refuse, and trash at the end of each day's operations. Dispose of it properly and clean the containers.

F. Keep locker rooms and lockers clean. Insects may be brought into the plant with clothing or lunches. Food scraps, empty beverage and milk bottles, or other materials left lying around will attract flies, roaches, and other insects, and supply food for their development.

G. Keep tool and equipment rooms and other areas not adjacent to the sifting, packaging, and storage rooms clean, as they frequently are sources of infestation from which insects may migrate to other parts of the plant.

H. Inspect drums, bags, and liners when they are received to be sure they are insect-free. If there are indications they may be infested, drums should be rejected or thoroughly cleaned and vacuumed. If the paper adhering to the bottom of the drum fits loosely, it is recommended the drum be rejected as insects may be present beneath the paper which could not be removed by vacuuming and would not be easily reached by an insecticide without soaking the paper. If the bags or liners appear infested, they should be rejected, or if they become infested in your plant, either destroy them if few in number, or fumigate if in large quantities. As insects

tend to crawl between the kraft plies, under the bottom tape and into other hidden areas, it is impossible to clean the bags without tearing them apart. If fumigation is required, methyl bromide should be used. However, fumigation must be done only by those qualified by experience to handle the work. Some pest control firms will be able to provide the service. After fumigation, remove all dead insects by vacuuming or brushing. Do not reuse drums unless they are thoroughly cleaned and when necessary properly fumigated. Milk for human consumption should not be placed in used bags or liners.

I. Store empty drums, bags, and liners in a separate room or building well removed from processing or packaging areas. Keep the finished product also in a separate room or building, if possible. Under no circumstances store sweepings, siftings, and other materials containing dry milk to be used for animal feed in the same areas as the containers, liners, or finished product to be used for human food. Keep storage areas clean, dry, and free from insects. Keep the reserve supply of empty drums and other containers closed and protect bags and liners from contamination with dust, dirt, or insects. Each day take only the immediate daily requirement of containers and liners into the packaging room. Do not place liners in proper position for filling of drum well in advance of the actual packaging operation. Insects that might crawl into your containers or liners will be in your product when it is packaged. From previous tests it has been found that temperatures of milk even as high as 160° F. at the time of packaging will not kill insects which may crawl into containers or liners, unless it comes in direct contact with them.

J. Stack all containers, liners, and finished product that will not be moved in 3 to 4 weeks on movable platforms or skids at least 9 inches from the floor and 18 inches from the wall to permit cleaning, inspection, and spraying. Supplies and products which will be moved shortly (within 3 to 4 weeks) may be placed on the floor but should be stored in sections and removed in the same manner--starting at the front of the section and working towards the back. As soon as one section has been removed, the area should be thoroughly cleaned and sprayed.

K. Clean thoroughly and line railway cars and trucks with kraft paper for all outgoing shipments of dry milk to reduce the hazard of insect infestation in transit. Select railroad cars with as good construction and as free from accumulated debris behind the wooden siding as possible.

USE OF INSECTICIDES FOR INSECT PREVENTION AND CONTROL

A. Use a malathion residual spray as a general-purpose insecticide. This should be prepared from a 57-percent malathion emulsifiable concentrate or a 25-percent wettable powder. Only premium grade malathion should be used. As certain impurities in malathion may develop an unpleasant odor with aging, it is recommended that no emulsifiable concentrate older than 6 months be used in the spraying of dry milk plants. However, in tests conducted to date no evidence has been collected to indicate that any off-flavor occurs in milk as a result of using malathion as recommended here. Apply the insecticide on a regular 2-month schedule, immediately following vacuuming and cleaning. Prepare the malathion spray by either mixing 1 pint of 57-percent emulsifiable concentrate or $1\frac{1}{2}$ pounds of wettable powder into $2\frac{1}{2}$ gallons of water. If a wettable powder is used, it should be applied with equipment which provides adequate agitation. The malathion concentration in the wettable powder sprays is lower because the residues are more toxic than those obtained with emulsion sprays. The wettable powder spray will cause some spotting, but it is the most effective type of spray on absorptive or porous surfaces and should be used when the appearance is of little concern. Where spotting is undesirable, use a spray made from the emulsifiable concentrate.

1. Apply the malathion spray in all sections of the plant and warehouses, but restrict application to those places or surfaces where insects hide or crawl, such as cracks, corners, edges of floors, lower parts of walls, floors under storage platforms, and protected places underneath and behind things.

2. Use spray equipment and nozzles that will produce a coarse spray with a minimum of drifting mist that could cause contamination. Protect the product, equipment, utensils, work surfaces, containers, and liners against spray drift during application and do not spray on or into any of these.

3. In unheated parts of plants in cool or cold sections of the country, spray applications will usually not be required until April 1 and may be discontinued after November 1. In heated parts of plants and warmer sections of the country the recommended spray schedule should be maintained throughout the year. In limited spots additional treatments may be required if insects such as roaches or ants are a problem.

4. Malathion residual spray is effective against a wide range of different kinds of insects, although some variations in method of application will probably be required for effective control. Such information can be obtained from officials mentioned in the section on "Insects Involved." Malathion is selected for routine application, because it is the most effective insecticide evaluated to date in milk plants for the control of Trogoderma and the black carpet beetle and is safe to use when applied as prescribed.

5. Areas such as low attic spaces which restrict individual movement and which may in addition contain hot water or air pipes are extremely difficult, if not impossible, to spray effectively. In such areas the use of a malathion aerosol may be advisable, but one should be certain there is no danger of contaminating the product. Aerosols should be used only after spraying is deemed impracticable, as a high percentage of any aerosol is lost through drifting, especially in poorly constructed buildings on windy days. Moreover, an aerosol settles only on the floor and other horizontal surfaces in sufficient amounts to be effective. Little residue is recovered on the walls or ceiling. A malathion aerosol should not be used in areas of plants in which milk is stored or processed.

6. Freight cars which have been thoroughly cleaned may be treated with aerosols or sprayed with malathion as an additional precaution. However, such treatments will not kill insects imbedded in grain and other debris that may accumulate behind the wooden siding of boxcars. After a spray or an aerosol has been applied, boxcars should be lined with kraft paper.

B. Lindane, which has a higher vapor toxicity than malathion, may be used in limited areas in which the insects can be reached only by vapors. However, it should not be used near stored milk.

C. Synergized pyrethrum, probably the safest of all insecticides for use in a food plant, is restricted to those conditions in which it will come in direct contact with the insects, as it has little residual toxicity. However, it may act as a repellent to many species of insects for a considerable length of time. Synergized pyrethrum aerosols are also effective only against exposed insects and are not recommended for the control of Trogoderma or carpet beetles. However, such aerosol-treated surfaces may also exhibit some repellency towards these insects.

D. Chlordane may be used as a surface spray in areas where there is no possibility of contaminating milk, equipment, or packaging materials.

E. Insecticides are a valuable supplement to sanitation for insect prevention and control, but under no conditions should they be considered as a substitute. An insect protected by accumulated milk or other debris is not likely to be killed by a contact insecticide.

F. Insecticide application in a food plant must be made only by an experienced and trained person with a knowledge of proper methods, or under the direct supervision of such a person. Hire a reputable pest control operator if you do not have a qualified employee at your plant.

G. It is impossible to give in a short space complete information on the use of insecticides for all the conditions and species of insects that might occur in drying plants. There are many kinds of insecticides, types of formulations, and kinds of application equipment available on the market. Be sure to select the right insecticide, proper formulation, and suitable equipment for the specific job to be done. When you buy insecticides, examine the ingredient statement on the label to determine the amount and kind of active ingredients. If you are not familiar with insecticides, obtain the advice of a reputable insecticide firm, pest control firm, or a State or Federal entomologist. The application of a cheap or ineffective insecticide, the use of the wrong material for a specific purpose, or the improper application of even the best of insecticides will not give satisfactory results, may contaminate the product or cause other injurious results, and will be a waste of time, effort, and money. Also remember that a food product must not contain either insects or insecticide. There are a number of factors influencing the choice of the form in which an insecticide will be applied in a food plant. Some of these are as follows:

1. Residual sprays are extremely useful because the lasting effect of the insecticidal deposit not only controls an active infestation but provides continuing protection against reinfestation. The application can be controlled carefully and restricted to places where insects hide, develop, or crawl, such as cracks and spaces between flooring and baseboards, and to other areas in which milk and other materials may accumulate. Malathion, chlordane, and lindane are examples of residual sprays.

2. Space sprays and aerosols will ordinarily be used in food plants for emergency treatments only, since they give only temporary results and do not usually get at the source of the trouble. Cover any exposed food, work surfaces, or open equipment during treatment to protect them from falling insects and settling spray mists. Synergized pyrethrum or allethrin are suitable materials for this method of application. Malathion, however, may be applied in spaces such as attics where there is no danger of contaminating the food product.

3. Insecticidal dusts are sometimes useful for blowing into cracks, spaces behind or underneath things, or other places difficult or impossible to reach with a liquid spray. They are preferable to sprays around electrical connections and wiring where a liquid would cause a short circuit. Dusts must be applied so they will not drift to places where there should be no insecticide. In some places the appearance of dust deposit is objectionable. Excessive moisture destroys the effectiveness of dust deposit by causing it to cake or harden on the surface. Many kinds of insecticides can be applied as dusts.

4. Fumigants are effective only in a tightly enclosed space or fumigation chamber where a high concentration of gas can be maintained for a number of hours. Methyl bromide is the most widely used fumigant, but all fumigants are dangerous to man in the concentrations used for insect control and should be applied only by experienced operators.

5. Some insecticides such as lindane have been dispensed as vapors, usually from an apparatus having an electrical heating unit. This method of dispensing insecticides must not be used in any part of the plant where the food product will be exposed to the vapor, even after the product is packaged, unless the containers are metal and sealed.

H. Some precautions to observe in using insecticides are as follows:

1. Have insecticides applied only by trained personnel or a reputable pest control firm.

2. Do not apply insecticides directly to foods, utensils, equipment, work surfaces, containers, liners, or packaged products, and protect such things against drifting insecticide during application. Exercise particular care to insure that insecticides such as malathion, chlordane, and lindane are applied so no contamination will occur.

3. Do not mix or store insecticides in processing, packaging, or product-storage areas.

4. Do not use oil-base insecticides in the presence of sparks or open flames, or on asphalt tile.

5. Pull master switches before spraying liquid insecticides around electrical switches, fuse boxes, or cables where short circuits might result. Do not restore electrical current until spray has dried. Dust insecticides are preferable around electrical connections.

6. In applying insecticides such as malathion, chlordane, or lindane, avoid unnecessary skin contact and breathing excessive amounts of spray mist or dust.

7. After spraying or dusting is completed, empty the equipment and clean it to prevent rusting and corrosion. Safely dispose of the residue from the equipment.

8. Store insecticides in a safe place.

INSPECTION IN RELATION TO INSECT PREVENTION

Constant vigilance for insect infestation is just as important as everyday sanitation and is a primary responsibility of the plant sanitarian. A follow-up inspection after special or routine cleaning operations and insecticide applications is essential to determine the effectiveness and to learn whether further action is required.

1. Inspect every place inside the plant and around the outside premises. The following include obvious critical areas, potential breeding sites, and some spots that are sometimes overlooked: walls, floors, cracks, various openings, corners, supply rooms, tool and equipment shelves and rooms, processing and packaging areas, locker rooms and lockers, desks in administrative and checkers' offices, storage and holding areas, within loose partitions, in attics, above false ceilings, behind wall panels, baseboards, and molding strips, on top of beams and ledges, on window sills, above window and door frames and behind loose ones, inside heat and ventilation ducts, inside tile and hollow brick walls, inside, on top, and underneath equipment, in product conveyors and chutes, inside, behind, and on top of electrical fuse and switch boxes, inside light switches, in and around storage and refuse bins or containers such as cans and boxes, under storage platforms, in reserve supplies of containers and liners, around and under loading docks and platforms, in

elevator shafts, in dust traps on exhaust fans, and in insulation on water pipes. As the adults are attracted to light, they are most frequently found around windows; the larvae, which are repelled by light, will usually hide in cracks and other dark areas. Rat baits are ideal media for insect growth and development and should be checked frequently for the presence of insects. Use bait which has been treated with an insecticide. Wasp and bird nests frequently harbor Trogoderma and carpet beetles and should be removed. Special attention to outside premises should be given in plants which may be near feed mills or warehouses, as the major pests of dry milk are also important pests of grain and other animal feeds. Look for both live and dead insects, or signs of insect activity. Some insects will leave trails in dust accumulations. Some hidden insects can also be detected by finding their cast skins, droppings, or excrement stains near their hiding places.

2. In inspecting dry milk, look primarily for the brown, fuzzy larvae of the Trogoderma beetles, and for their empty cast skins. Since the larvae live several months to a year or more and shed their skins a number of times, there are likely to be many more cast skins than larvae present if the product has been infested very long. The cast skins will usually be on the surface, and the larvae on or near the surface. The larvae may also be in the folds of the liner near the tie, between the layers of a multiple liner, or between the liner and the container.

3. Some insects found in milk plants, such as roaches and silverfish, tend to hide during the day and be active at night. You can often find them by quietly entering a dark room and shining the beam from a flashlight around the room, or by suddenly snapping on the lights. The daytime hiding places can be located by watching where the insects run for cover.

4. Useful tools for inspection are a flashlight and an ice pick, spatula, or screwdriver with a long, slender blade. A hand lens is helpful but not necessary. The flashlight is essential to see behind and underneath things, into dark corners, and into cracks and openings. The ice pick, spatula, or screwdriver is used to stir, scratch, and probe into protected places.

PLANT CONSTRUCTION IN RELATION TO INSECT PREVENTION

A. Modern, tight, concrete or brick construction is desirable because it permits easy cleaning, prevention of accumulations of milk powder, elimination of insect hiding places, and fumigation when necessary.

B. In old plants certain beneficial improvements should be made where possible and if economically feasible:

1. Eliminate false floors, walls, ceilings, doors, and window casings, and dead spaces under equipment, especially in packaging and sifting rooms. These areas can accumulate large quantities of milk powder in which insects may develop. Such concealed and protected insects may spread into the plant and infest your product. If elimination is not possible, holes may be cut in such areas so the spaces can be cleaned and sprayed.

2. A tightly constructed sifting room will do much to eliminate dust from drifting throughout a building.

3. Fill cracks or holes in floors and walls, and around posts and supports. Renovate old or badly worn floors, or overlay with suitable material.

4. Remove mopboards and fill any openings where walls and floors meet.

5. Paint walls or face them with tile for easy cleaning.
6. Close up any unnecessary openings to keep insects out.
7. Provide tight-fitting screens with not less than 16 meshes per inch for windows and doors. Instruct employees to keep them closed and repaired at all times. Night flying insects especially are attracted to plants by artificial lighting. Have self-closing devices on screen doors at all entrances. Do not prop doors open. Fit doors with metal bumper plates for protection against hand carts and kicking. Use fly chaser fans at loading doors and at intake openings. Portable fans with 12"-16" blades are good.
8. Construct storage bins so workmen can clean in and around them quickly and easily. Replace wooden bins with metal.
9. Construct loading docks and platforms so waste materials cannot accumulate under or around them.
10. Construct conveyors and chutes so there are no ledges or dead spaces, and so they can be cleaned thoroughly.
11. Concentrate electric switch and fuse boxes in one area preferably away from the drying and sifting room.
12. Eliminate hollow tiles where possible.
13. Replace old windows whose wooden casings may invite insect infestation with glass bricks, especially in processing areas. If replacement is not feasible in other areas, drill a $\frac{1}{2}$ -inch hole at top and bottom of the casing into which a spray can be introduced. After spraying plug holes with a rubber cork.
14. Wooden tables, stands, etc. should also be replaced with metal ones.

KEEP PROPER RECORDS

A. Good records are necessary for sound management. They will also provide a history of your sanitation and insect-prevention operations that can be extremely useful for answering certain questions that may arise.

B. Here are some records you should keep:

1. Date and areas covered in vacuuming, cleaning, insecticide application, and special inspections.
2. Date, kind, analysis, amount, and source of insecticide purchases.
3. Method of insecticide application and how much used.
4. Date and nature of corrective measures or remedial construction.

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